17. A nozzle assembly as set forth in claim 15, wherein said first portion of said bore has a lesser diameter than said second portion.

18. [Deleted].

19. [Deleted].

20. [Deleted].

REMARKS

The reference patents cited by the Examiner have been carefully reviewed, as have the comments made by the Examiner in connection with his initial rejection of the claims in the original application. By this amendment, the claims are amended in a manner to more particularly point out the patentable aspects of the invention.

Claim 1 has been amended in a number of respects. In particular, it is noted that an enlarged flange is now recited on the shank portion of the nozzle and that the sleeve is recited as being adjacent to the flange to lock the nozzle to the nozzle housing. This is effective in eliminating the problem of loosening of the nozzle which is recited on page 2 of the application in the paragraph beginning at line 5.

Further, amended claim 1 calls for the sleeve to fit on the nozzle in a manner to present a gap between the sleeve and the shank portion of the nozzle along a majority of the length of the shank. In the preferred embodiment of the invention shown in FIG. 5, this gap between the nozzle and shank is identified by reference numeral 162. The provision of a gap at this location is of particular importance because it minimizes the heat transfer between the nozzle 144 and the sleeve 156 in order to prevent undue heat transfer to the mold insert which is identified by numeral 20 in FIG. 1 of the application drawings. This maintains the nozzle 144 at a consistently high temperature without undue heat loss and also prevents the sleeve 156 from becoming unduly heated due to heat transfer from the nozzle in order to maintain the insert 20 at a relatively cool temperature in order to product quality parts from the molding process. While there is a contact between the sleeve and the nozzle, it is minimized by being restricted to the area of the enlarged flange 147 and the immediately adjacent area, thus creating only a small area of contact and only a small amount of undesirable heat transfer between these parts.

It is respectfully submitted that the prior art fails to teach such a structure and fails to even recognize that heat transfer between these parts should be minimized.

The principal referenced relied upon by the Examiner is the patent to Feitl. The Examiner has already acknowledged that Feitl relies upon physical contact between the tapered nut 23 against the conical part of the nozzle 12 in order to hold the nozzle in place. The nut 23 thus must necessarily physically contact the outer end portion of the nozzle 12 in the Feitl arrangement in order to function at all. The Feitl device simply could not possibly provide a gap between the nut or sleeve

23 and the nozzle 12 at the outer end portion of the nozzle, because the device would not work under these conditions. In contrast, claim 1 specifically calls for the sleeve to be threaded adjacent to an enlarged flange on the nozzle rather than against the conical head, and claim 1 also specifically calls for a gap between the sleeve and shank along a majority of the outer end portion of the shank in order to minimize the heat transfer in a manner that is contradictory to what is taught by the Feitl reference.

The British Patent No. 1, 097,325 adds nothing significant to what is taught by Feitl. The sleeve 15 in the British Patent actually contacts on its outer end portion the nozzle body, again completely contrary to what claim 1 specifically recites. Because both the Feitl patent and the British Patent teach and rely on actual physical engagement of the sleeve with the outer end portion of the nozzle, neither patent teaches the exact opposite arrangement that amended claim 1 defines. It would hardly be obvious based on anything taught in either patent to do what only the present applicant has done, provide a gap between the outer end portion of the nozzle and the sleeve which secures it in place.

Further, the British Patent uses the set screws 17 in order to secure the nozzle and does not actually use the sleeve 15 as such for this purpose. For this reason also, the British Patent neither teaches nor makes obvious what is recited in amended claim 1 of the present application.

For all of these reasons, the combination set forth in amended claim 1 is clearly distinct from anything found in the references of record or any other known prior art. None of them teaches a gap between the sleeve and the outer end portion of the nozzle. In fact, the prior art teaches

unanimously to the contrary in that there is no such gap provided in any of the prior art devices. Further, the prior art fails to even recognize the problem of heat transfer in this portion of the nozzle assembly, so there can be no basis for the invention being obvious in light of prior art that does not even recognize that there is a problem to be solved.

Dependent claims 3 and 8-10 have been canceled. Some of the remaining dependent claims have been modified in minor respects to conform with the amendment made to claim 1. Each of the remaining dependent claims 2, 4-7 and 11 are allowable by reason of their dependence upon an allowable parent claim, as well as on their own merits. The features that are added by each of these dependent claims are not found in the references cited by the Examiner.

Claim 12 as amended is an independent claim that is allowable for the same reasons as claim 1, and for additional reasons as well. Again, claim 12 calls for an enlarged flange on the shank of the nozzle and a sleeve threaded adjacent to the flange in order to prevent the nozzle from unthreading, along with a gap between the sleeve and the outer end portion of the shank. These features are novel and not obvious from anything found in the prior art for reasons given previously.

Claim 12 additionally calls for a heat expansion gap between the flange on the shank and the shoulder which is presented in the nozzle housing. As previously indicated, the Feitl Patent has no flange at all. There is no heat expansion gap of the type set forth in amended claim 12 in any of the prior art references, so this feature in addition to the gap recited between the sleeve and nozzle differentiates claim 12 from the prior art.

Claim 14 has been canceled and dependent claim 13 has been amended in a minor respect. Claim 13 is allowable by reason of its dependence upon an allowable parent claim and on its own merits as well. In the latter respect, the prior art does not teach a shoulder in the barrel portion of a nozzle housing and a shank that is adjacent to such a shoulder in a combination and construction of the type recited by the claims of the present invention.

Amended claim 15 is the final independent claim in the application, and it is allowable for the same reasons as claim 1 and for other reasons in addition. Amended claim 15 calls for an enlarged flange which provides the locking effect when the sleeve is threaded into the bore, along with a gap between the sleeve and the outer end portion of the shank. These features are not found anywhere in the prior art as indicated previously in connection with claim 1.

Further, amended claim 15 calls for the shank of the nozzle to have an end that is adjacent to but spaced from a first shoulder in the bore of the barrel in order to provide a heat expansion gap between these parts. Nothing remotely similar to this is found in any of the references, and this feature allows for thermal expansion without creating undue stress and possible cracking of the parts when they are heated in normal use.

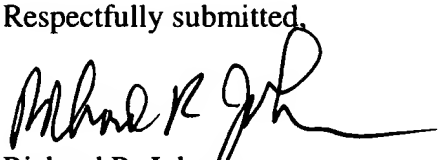
Thus, amended claim 15 is differentiated from the prior art references in a number of respects and is allowable. Claims 16 and 18-20 are canceled and claim 17 is dependent upon claim 15 and is allowable for that reason, as well as on its own merits.

For all of the foregoing reasons, it is respectfully submitted that each of the claims remaining in the application is clearly allowable. Consequently, this application is believed to be

in condition for allowance, and a formal notice to that effect is requested in due course. If the Examiner feels that a telephone conference will in anyway expedite the handling of this case, he is invited to call the number listed below at his convenience.

The Commissioner is hereby authorized to charge any additional fees that are required, or credit any overpayment to Deposit Account No. 19-2112.

Respectfully submitted,



Richard R. Johnson
Reg. No. 27,452

SHOOK, HARDY & BACON L.L.P.
One Kansas City Place
1200 Main Street
Kansas City, Missouri 64105-2118
816/474-6550
Enclosures
RRJ/bsd

VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended). A nozzle assembly for injecting molten plastic into a mold cavity, said nozzle assembly comprising:

a nozzle housing presenting a passage therethrough for receiving the molten plastic, said passage having a configuration to present a shoulder therein;

a nozzle having a detachable threaded connection with said housing and a passageway communicating with said passage when the nozzle is connected with the housing, said nozzle having a discharge opening for injecting the molten plastic into the mold cavity;

a shank portion of said nozzle having an outer end portion and an inner end portion providing said detachable connection of said nozzle with said housing;

an enlarged flange on said shank portion of said nozzle at a location between said inner and outer end portions and adjacent to said shoulder;

internal threads on said nozzle housing extending at a location spaced outwardly from said nozzle when the nozzle is connected to the housing; and

a sleeve having a threaded connection with said internal threads on the nozzle housing and being adapted to be tightened on said internal threads to a position adjacent said flange to lock the nozzle to said nozzle housing, said sleeve fitting on said nozzle in a manner to present a gap between said sleeve and said shank portion along a majority of the length of said outer end portion of said shank portion.

2. A nozzle assembly as set forth in claim 1, wherein said housing presents a bore having a relatively small portion into which said nozzle is threaded and a relatively large portion presenting said internal threads.

3. [Deleted].

4. A nozzle assembly as set forth in claim 1 [3], including a second shoulder in said bore and an [enlarged flange on said nozzle] end of said shank portion adjacent to said second shoulder.

5. A nozzle assembly as set forth in claim 2, wherein said sleeve is disposed in said relatively larger portion of said bore between said nozzle and said internal threads on said housing.

6. (Amended). A nozzle assembly as set forth in claim 1, wherein said housing has a base and a barrel extending from said base, said barrel having an internally threaded bore, said shank portion of said nozzle having a threaded connection with said internally threaded bore to establish said detachable threaded connection.

7. A nozzle assembly as set forth in claim 6, wherein said bore terminates at a second shoulder presented in said barrel, said [nozzle having a] shank portion being threaded into said bore adjacent to said second shoulder.

8. [Deleted].

9. [Deleted].

10. [Deleted].

11. (Amended). A nozzle assembly as set forth in claim 1 [8], wherein said sleeve has an end adjacent to said flange.

12. (Amended). A nozzle assembly for injecting molten plastic into a mold cavity in a continuous high volume molding process for molding thin walled parts, said nozzle assembly comprising:

a nozzle housing having a base and a barrel extending from said base, said housing presenting a passage therethrough for receiving the molten plastic;

a shoulder in said passage facing away from said base;

an end portion of said barrel presenting a bore connecting with said passage;

a nozzle having an externally threaded shank and a nozzle head on said shank, said shank having an outer end portion and an inner end portion presenting external threads establishing a threaded connection with said bore to connect said nozzle with said housing;

an enlarged flange on said shank located adjacent to but spaced from said shoulder to present a heat expansion gap between said flange and shoulder;

a passageway through said nozzle communicating with said passage when the nozzle is connected with the housing;

at least one discharge opening in said nozzle head for receiving molten plastic from said passageway and injecting the plastic into the mold cavity; and

a sleeve threaded into said bore and having a fully tightened condition wherein said sleeve [prevents] is adjacent to said flange to prevent the nozzle from unthreading from the housing, said sleeve fitting on said nozzle in a manner to present a gap between said sleeve and said outer end portion of said shank along a majority of the length of said outer end portion of said shank.

13. (Amended). A nozzle assembly as set forth in claim 12, wherein said bore terminates at a second shoulder presented in said barrel, said shank being threaded into said bore adjacent to said second shoulder.

14. [Deleted].

15. (Amended). A nozzle assembly for injecting molten plastic into a mold cavity in a continuous high volume molding process for molding thin walled parts, said nozzle assembly comprising:

a nozzle housing having a barrel presenting a passage therethrough for receiving the molten plastic, said barrel terminating in an end;

an internally threaded bore in said barrel extending into said end thereof, said bore having threaded first and second portions and presenting a first shoulder at one end of said first portion and a second shoulder between said first and second portions;

a nozzle having a shank and a nozzle head presenting a discharge opening for injecting molten plastic into the mold cavity, said shank having an outer end portion and an inner end portion which is [being] externally threaded and [being] threaded into said first portion of said bore and said shank having an end adjacent to but spaced from said first shoulder to provide a heat expansion gap between said end of the shank and said first shoulder;

an enlarged flange on said shank adjacent said second shoulder;

a passageway through said nozzle providing a flow path for the molten plastic between said passage and said discharge opening; and

an externally threaded sleeve threaded into said second portion of said bore adjacent to [a surface of said shank] said flange to secure the nozzle to said housing, said sleeve fitting on said nozzle in a manner to present a gap between said sleeve and outer end portion of said shank along a majority of the length of said outer end portion of said shank.

16. [Deleted].

17. A nozzle assembly as set forth in claim 15, wherein said first portion of said bore has a lesser diameter than said second portion.

18. [Deleted].

19. [Deleted].

20. [Deleted].